REMARKS/ARGUMENTS

This is intended as a full and complete response to the Office Action dated September 21, 2009, having a shortened statutory period for response set to expire on December 21, 2009. Please reconsider the claims pending in the application for reasons discussed below.

Claims 1-23 and 63 are pending in the application and remain pending following entry of this response. Applicants submit that the amendments do not introduce new matter.

Further, Applicants are not conceding in this application that those amended (or cancelled) claims are not patentable over the art cited by the Examiner, as the present claim amendments and cancellations are only for facilitating expeditious prosecution of the claimed subject matter. Applicants respectfully reserve the right to pursue these (pre-amended or cancelled claims) and other claims in one or more continuations and/or divisional patent applications.

Provisional Double Patenting

Claims 1-23 and 63 are provisionally rejected under 35 U.S.C. § 101 as claiming the same invention as that of Application No. 10/794,918.

As stated in response to the previous Office Action, Applicants request this rejection be held in abeyance as no claims have yet issued.

Claim Rejections - 35 U.S.C. § 103

Claims 1-3, 5, 14-15, 19-20 and 63 are rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over *Trikkonen et al.* (U.S. Publication 2004/0002364, hereinafter, "*Trikkonen*") in view of *Onggosanusi et al.* (U.S. Publication 2002/0114269, hereinafter, "*Onggosanusi*").

Applicants respectfully traverse these rejections.

The Examiner bears the initial burden of establishing a *prima facie* case of obviousness. See MPEP § 2141. Establishing a *prima facie* case of obviousness begins with first resolving the factual inquiries of *Graham v. John Deere Co.*, 383 U.S. 1 (1966). The factual inquiries are as

follows:

    (A) determining the scope and content of the prior art;

    (B) ascertaining the differences between the claimed invention and the prior art;

    (C) resolving the level of ordinary skill in the art; and

    (D) considering any objective indicia of nonobviousness.

Once the *Graham* factual inquiries are resolved, the Examiner must determine whether the claimed invention would have been obvious to one of ordinary skill in the art.

Respectfully, Applicants submit that the Examiner has not properly characterized the teachings of the references and, as a result, has failed to ascertain differences between the claimed invention and the prior art.

For example, in rejecting claim 1, the Examiner states that *Trikkonen* teaches performing spatial processing on at least one of the pilot and data symbols for each subband, with the spatial processing randomizing a plurality of effective single-input single-output (SISO) channels observed across the plurality of subbands. However, Applicants respectfully submit that *Trikkonen* is silent as to randomizing effective SISO channels. In fact, *Trikkonen* fails to mention effective SISO channels, or SISO at all.

Further, Applicants respectfully submit that fails to teach "demultiplexing pilot symbols and the block of data symbols onto a plurality of subbands to obtain, for the data packet, a plurality of sequences of pilot and data symbols for the plurality of subbands" as recited in claim 1. In contrast, *Trikkonen* teaches, in paragraph [0059] that:

> ... The training or pilot signal is sent independently of the data stream and is used
> by the receiver to provide an estimated value for the channel transfer model.

And there is certainly no teaching of obtaining "for the data packet, a plurality of sequences of pilot and data symbols for the plurality of subbands."

While the Examiner concedes that *Trikkonen* fails to teach that "the spatial processing is performed for each subband," the Examiner relies on paragraphs [0041]-[0043] of *Onggosanusi* as teaching this element. These paragraphs are listed here for convenience:

> [0041] Generally a multi-antenna framework can be defined to include P transmit
> antennas embodied within one or more transmitters, Q receive antennas

embodied within one or more receivers, and L propagation paths between the respective antennas. Within the multi-antenna framework, typically a plurality of non-interfering sub-channels can be defined. Transmission via the various sub-channels can be controlled through the appropriate selection of the values for a beamformer vector and the specific value for a frequency index. By carefully computing or selecting the sets of values from which the beamformer vector and the frequency index are selected, substantially orthogonal and/or non-interfering sub-channels can be defined.

[0042] FIG. 1 illustrates an exemplary schematic block diagram of a transmitter 10 for transmitting a single stream of data 12, via a plurality of transmit antennas 14. The data stream 12 typically comes from the output of an encoder combined with a modulator. The encoder corresponds to a certain error-correcting code, such as block code, convolutional code, concatenated code, Turbo code, or any other kinds. The modulator is a device that maps a binary data stream (composed of zeros and ones) onto a signal constellation. Examples of modulation scheme are phase shift keying (PSK), pulse amplitude modulation (PAM), quadrature amplitude modulation (QAM). The transmitter 10 includes a channel state processing unit 16 and at least one single stream transmitter module 18 coupled to the channel state processing unit 16. The channel state processing unit 16 incorporates a channel state information estimator 20 which identifies a set of available orthogonal sub-channels within the channel space by analyzing the inherent gain associated with each signal path between each of a set of one or more transmit antennas 14 and each of a set of one or more corresponding receive antennas 22, as shown in FIG. 4. The channel state processing unit 16 additionally incorporates sub-channel selection circuitry 24 and a transmit power allocator 26, both of which are coupled to the channel state information estimator 20. The sub-channel selection circuitry 24 selects for usage one or more sub-channels for use by one or more signal stream transmitter modules.

[0043] The sub-channels are typically selected based upon the sub-channel having preferred signaling characteristics as determined through an analysis of the channel state information. In connection with selecting a sub-channel, a frequency index is selected and a corresponding set of beamformer weights are determined, both of which are respectively identified by a frequency index selector 28 and a beamformer weight determiner 30. Once selected, the frequency index and the set of beamformer weights are passed on to the single stream transmitter module 18. The single stream transmitter module 18 additionally receives a stream of data 12, often after the signal strength of the stream of data 12 has been modulated by a power amplification factor. The power amplification factor is determined by the transmit power allocator 26 as part of the channel state processing unit 16.

Despite the Examiner's contention, there is no teaching in these sections that spatial processing is performed "on at least one of the *pilot and data symbols* for each subband with at least one steering vector selected for the subband." In fact, there is no mention in *Onggosanusi* of pilots, at all.

Each of independent claims 14, 19 and 63 includes features substantially similar to those of claim 1, and are therefore also allowable over the art of record for at least the reasons given above. Accordingly, Applicants submit claims 1, 14, 19, and 63, as well as their dependents are allowable and request withdrawal of this rejection.

Claims 5, 16 and 21 are rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over *Trikkonen* in view of *Onggosanusi*, and further in view of *Kim* (U.S. Patent No. 6,937,189). Claim 7 is rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over *Trikkonen* in view of *Onggosanusi*, and further in view of *Ketchum et al.* (U.S. Publication 2003/0108117, hereinafter, "*Ketchum*"). Claims 17 and 22 are rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over *Trikkonen* in view of *Onggosanusi* and *Kim*, and further in view of *Ketchum*. Claim 4 is rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over *Trikkonen* in view of *Onggosanusi*, and further in view of *Honig* (U.S. Patent No. 6,956,897). Claims 6, 10 and 12 are rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over *Trikkonen* in view of *Onggosanusi*, and further in view of *Walton et al.* (U.S. Publication 2003/0235147, hereinafter, "*Walton*"). Claim 8 is rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over *Trikkonen* in view of *Onggosanusi*, and further in view of *Jasper et al.* (U.S. Patent No. 6,441,786, hereinafter, "*Jasper*"). Claim 9 is rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over *Trikkonen* in view of *Onggosanusi*, and further in view of *Shattil* (U.S. Publication 2004/0086027). Claim 11 is rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over *Trikkonen* in view of *Onggosanusi* and *Walton*, and further in view of *Hudson et al.* (U.S. Patent No. 6,477,161). Claims 13, 18 and 23 are rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over *Trikkonen* in view of *Onggosanusi*, and further in view of *Lewis* (U.S. Publication 2004/0102157).

Each of these claims ultimately depends from one of independent claims 1, 14 or 19. Further, none of the above cited references overcomes the shortcomings in the teachings of *Trikkonen* and *Onggosanusi* discussed above.

Accordingly, Applicants submit these claims are also allowable over the art of record and respectfully request withdrawal of this rejection.

CONCLUSION

Therefore, for at least the reasons presented above with respect to all of the pending claims subsequent to entry of this response, Applicants assert that all claims are patentably distinct from all of the art of record. All objections and rejections having been addressed, it is respectfully submitted that this application is in condition for allowance and a Notice to that effect is earnestly solicited. If any points remain in issue that the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Charge Statement: For this application, the Commissioner is hereby authorized to charge any required fees or credit any overpayment to Deposit Account 17-0026.

Respectfully submitted,
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